

1. Gray code is commonly used for :
 - a) Rotational Shaft encoders
 - b) Alpha-numeric Character encoders
 - c) Error correcting codes
 - d) None of the above
2. An S Band Radar operating at 3000 MHz, PRF 500, pulse width 1 μ sec, encounters a radially approaching target closing in at 150 Meters/sec. The doppler shift due to target motion is
 - a) Zero Hz
 - b) 1500 Hz
 - c) 3000 Hz
 - d) None of the above
3. In PCM a fairly constant signal to quantisation noise ratio over large signal power variation can be maintained by :
 - a) adopting logarithmic companding
 - b) adopting exponential expansion
 - c) adopting larger sampling frequency
 - d) None of the above.
4. In the context of ionospheric sky wave propagation the critical frequency f_c for a given ionospheric layer is :
 - a) The lowest frequency that will be returned down to earth by that layer after having been beamed straight at it.
 - b) The highest frequency that will be returned down to earth by that layer after having been beamed straight at it.
 - c) that frequency at which polarisation of the wave undergoes a drastic change
 - d) None of the above
5. In troposcatter communication systems; Rayleigh fading is caused by ;
 - a) destructive interference due to multi frequency signals
 - b) destructive interference due to multi path propagation
 - c) interference due to different polarisation
 - d) absorption in the troposphere.

6. When an analogue signal occupying 0 to f_{max} is sampled at a rate slightly less than $2f_{max}$:

- a) lower frequency aliases over lower frequency
- b) higher frequencies alias over lower frequencies
- c) lower frequencies alias over higher frequencies
- d) higher frequency aliases over higher frequency.

7. Radiation losses in strip lines are

- a) less than in microstrip
- b) higher than the microstrip
- c) same as in microstrip
- d) None of the above

8. A ferrite is

- a) a non-conductor with a magnetic properties
- b) an intermetallic compound with good conductivity
- c) an insulator which attenuates magnetic fields
- d) a microwave semiconductor

9. In PCM signal to quantisation noise ratio can be improved by :

- a) increasing sampling frequency
- b) increase of no. of bits
- c) decreasing sampling frequency
- d) None of the above

10. A FM pager working at 90 MHz is to be retuned to 100 MHz by changing air-cored coil of the tuned circuit. If the original coil had 10 turns, the new coil will have :

- a) 20
- b) 12
- c) 9
- d) 5

11. Entropy of a message source with 5 symbols is maximum at :

$$a) P_0 = P_1 = P_2 = P_3 = P_4 = \frac{1}{4}$$

$$b) P_0 = P_4 = \frac{1}{8}; P_1 = P_2 = P_3 = \frac{7}{24}$$

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- d) None of the above

12. The magnitude of the signal power due to a target at the receiver of a mono-static radar is:

- a) directly proportional to the range of the target
- b) inversely proportional to the range of the target
- c) proportional to the $(1/R)^3$, where 'R' is the target range
- d) proportional to the $(1/R)^4$, where 'R' is the target range

13. A 256×8 ROM can be thought of as:

- a) 256 combinational logic functions with 8 variables.
- b) 8 combinational logic functions with 8 variables.
- c) 8 combinational logic functions with 256 variables.
- d) None of the above

14. A class 'B' amplifier is a type of amplifier having :

- a) high power output
- b) high gain
- c) high efficiency
- d) has active devices conducting 50% of the time.

15. For a given waveguide with dimension $a \times b$ cms., the breakdown voltage of the waveguide can be substantially increased by:

- a) changing the wall thickness
- b) changing the wall conductors
- c) pressurising the waveguide
- d) None of the above

16. If a waveguide with internal dimension of 5×3.5 cm is used to carry a 10 GHz signal, the guide wave length of the dominant TE mode of propagation would be :

- a) 3.58 cm
- b) 3.14 cm
- c) 5.1cm
- d) 4.6 cm

17. The effective isotropic radiated power EIRP of a given antenna system can be increased by:

- a) increasing the transmission power P_t
- b) increasing the directive gain of the antenna
- c) reducing the feed losses
- d) all of the above

18. A electro dynamic instrument which responds to the average value of a wave form is connected across a 220V AC outlet. You expect the meter to read:

- a) 154V
- b) 110V
- c) 198V
- d) 314V

19. A $250 \mu\text{F}$ Capacitor and a $1 \text{ M}\Omega$ resistor are connected to a 48V battery through a switch. After a lapse of 4 minutes, 10 seconds, the voltage across capacitor will be;

- a) 48V
- b) 24V
- c) 17.66V
- d) 0V

20. A monopulse tracking technique is a technique in which

- a) extremely low PRF is used
- b) angular error signal is extracted corresponding to each individual pulse
- c) Active Tracking Techniques are resorted to
- d) Antenna remains stationary over the pulse duration

21. For any amplifier, its intercept point is

- a) lower than 1dB compression point
- b) same as 1dB compression point
- c) higher than 1dB compression point
- d) None of the above

22. What will be the value of average length of an ideal variable length encoding for a source with

$$P_0 = \frac{1}{2}, P_1 = \frac{1}{4}, P_2 = \frac{1}{8}, P_3 = \frac{1}{8}$$

- a) 2 bits
- b) greater than 2 bits
- c) less than 2 bits
- d) none of the above

23. The Truth table below, represents

Inputs		Output
X	Y	
0	0	1
0	1	0
1	0	0
1	1	1

- a) Exclusive OR
- b) Exclusive NOR
- c) AND
- d) None of the above

24. PIN diodes are widely used as

- a) Detectors
- b) Switching elements
- c) Voltage sensors
- d) Current amplifiers

25. The product of the two BCD integers (00100011) and (00011100) is the BCD integer:

- a) 001010000010
- b) 100001000000
- c) 011000000011
- d) 010000010100

26. Quarterwave transformers are used to match load impedance to source impedance at a given centre frequency. In order to perfectly match a 100 ohms source to a 50 ohms load, the characteristic impedance of a quarterwave transformer should be:

- a) 25 ohms
- b) 150 ohms
- c) 70.7 ohms
- d) 35.5 ohms

27. A frequency source is to be calibrated by the tank circuit of known Q (1000). A display showing the frequency response of the tuned circuit allow computation of the 3 dB band width as 1 MHz. The frequency of the source is:

- a) 1 GHz
- b) 1 kHz
- c) 1 MHz
- d) 500 MHz

In an Audio amplifier negative feed back is used to stabilise the gain. The total harmonic distortion produced by the amplifier :

- a) increases with negative feed back
- b) decreases with negative feed back
- c) will remain unchanged
- d) will remain unchanged, but levels of harmonics will relatively vary.

Cross-over distortion is normally encountered in :

- a) Phase shift oscillator
- b) Class-A amplifier
- c) High frequency wide band amplifier
- d) Class-B Amplifier

The gain bandwidth frequency of a transistor, f_T , is the frequency at which

- a) Alpha of the transistor falls by 3dB
- b) Beta of the transistor falls by 3dB
- c) Power gains of the transistor falls to unity
- d) Beta of the transistor falls to unity

The binary number 10111011 is equivalent to the decimal number:

- a) 273
- b) 533
- c) 187
- d) 167

No. of coset leaders of standard array constructed for (7,4) Hamming code will be :

- a) 16
- b) 8
- c) 4
- d) 7

It is proposed to increase the power output of a Class A Audio Amplifier by replacing R-C coupling to transformer coupling. The output is expected to increase by :

- a) 25%
- b) 50%
- c) 100%
- d) 300%

34. Frequency of a pulse source is measured by counting the number of pulses gated by an asynchronous 1 sec gate pulse (1 sec gate pulse is derived from a source with ± 10 ppm accuracy). Measurement error will be :

- a) \pm 10 ppm
 b) \pm 10 ppm \pm 1 Hz
 c) \pm 10 ppm \pm 1/2 Hz
 d) \pm 1/2 Hz

- $\frac{1}{2} \times 10^{-10} \text{ m}^2$

1180 + 15

35. Among the following types of transmitting tubes, which one is not suitable for implementation of fully coherent radar

- a) Klystron
 - b) TWT
 - c) Magnetron
 - d) Cross Field Amplifier (CFA)

36. MESFET with aluminium gates are susceptible to burn out due to static discharge. In order to reduce this problem

- a) the gate thicknesses are increased
 - b) aluminium gates are replaced by dielectric gates
 - c) aluminium is replaced by gold gates
 - d) None of the above

37. The binary number 101.001 is equivalent to the decimal number:

- a) 5.125
 - b) 5.1
 - c) 5.5
 - d) 5.625

38. In pulse code modulation every bit increase in sample digitisation contributes :

- a) a 3 dB improvement in S/N_q
 - b) a 9 dB improvement in S/N_q
 - c) a 6 dB decrement in S/N_q
 - d) None of the above

39. The permittivity of free space is

- a) $4\pi \times 10^{-7}$ H/m
 b) 8.85×10^{-12} F/m
 c) 8.85×10^{-8} F/cm
 d) $4\pi \times 10^{-36}$ pF/mm

40. In an 8-bit two's complement representation, the binary number 11101111 is equivalent to the decimal number:

- a) 27 b) -17 c) -25 d) 35

When a sine wave input is given to an oscilloscope with horizontal sweep off, the oscilloscope will show:

- a) a sine wave
- b) a dot
- c) a horizontal line
- d) a vertical line

A full wave rectifier is used to rectify 230V 50 Hz main. Its ripple will be :

- a) 50 Hz
- b) 100 Hz
- c) 230 V
- d) None

The equations below illustrate:

$$A(B+C) = AB + AC$$

$$A+(BC) = (A+B).(A+C)$$

- a) Commutative Law
- b) Associative Law
- c) Distributive Law
- d) None of the above

Ideal band width of a pulse radar with 500 KW peak power, 1 microsecond pulse width and PRF = 500 is about

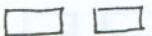
- a) 10 MHz
- b) 1 MHz
- c) 200 KHz
- d) 5 MHz

A tuned circuit is used as a filter at the output of RF amplifier developing 0 dBm across 50Ω assuming the loaded Q of the tuned circuit to be 1000, the RF voltage across the capacitor will be :

- a) 100 mV rms
- b) 5V rms
- c) 225V rms
- d) 1 KV rms

In a delta modulator signal to quantisation noise ratio can be maximised by :

- a) by increasing step size and reducing sampling frequency
- b) by increasing step size and sampling frequency
- c) by decreasing step size and increasing sampling frequency
- d) by decreasing step size and sampling frequency



47. A silicon controlled rectifier can be turned on by pulsing the gate with a high current. It can be turned 'off' by:

- a) pulsing the gate again
- b) by changing the polarity of the gate pulse
- c) by reversing the anode voltage
- d) by reducing the anode voltage

48. Charge of an electron is

- a) 1.6×10^{-19} C
- b) 9.1×10^{-31} C
- c) 8.854×10^{-12} F/m
- d) 1.6×10^{-19} F/m

49. In a radar front end a two stage cascaded amplifier is used. The first stage has a gain of 10dB and a noise figure 1.5 dB. The second stage has a gain of 17dB and a noise figure of 3dB. The overall cascaded noise figure is then

- a) 3.05dB
- b) 4.5dB
- c) 1.55dB
- d) 1.79dB

50. Even parity check can :

- a) correct all single errors
- b) detect all even errors
- c) detect all odd errors
- d) correct all odd errors

51. A power amplifier with $P_o = 16W$ and $Z_o = 4 \Omega$ is to be connected to an array of loudspeakers, 4 columns with two speakers in each column, what would be the best choice? :

- a) $8 \Omega, 4W, 8$ Nos.
- b) $4 \Omega, 2W, 8$ Nos.
- c) $8 \Omega, 2W, 8$ Nos.
- d) None of the above

52. Schmitt Trigger gates exhibits a property called:

- a) Inversion
- b) Hysteresis
- c) Buffering
- d) Negation

53. The equation $\overline{(A \cdot B \cdot C \cdot D)} = \overline{A} + \overline{B} + \overline{C} + \overline{D}$ illustrates

- a) Idempotency
- b) Inversion theorem
- c) De Morgan's theorem
- d) None of the above

54. A power density at a distance 'r' from an isotropic source is :

- a) directly proportional to the square of power radiated
- b) directly proportional to the power radiated and inversely proportional to the distance 'r' from the point source
- c) directly proportional to the power radiated and inversely proportional to the square of the distance 'r' from point source
- d) inversely proportional to the power radiated and the square of the distance 'r' from point source

55. In the context of integrated circuits PAL stands for:

- a) Positive And Logic
- b) Programmable And Logic
- c) Programmable Array Logic
- d) None of the above

56. Modulation method used for picture transmission in TV broadcast is :

- a) SSB
- b) VSB
- c) DSB
- d) DSB-SC

57. In a 'Vectored interrupt' System branching to the service routine :

- a) depends on data supplied by an external source
- b) does not depend on external data
- c) occurs only at power ON time
- d) None of the above

58. The phenomenon of ground (surface) wave propagation is used in :

- a) Very high frequency communication
- b) Very low frequency radio communication
- c) Microwave frequency radio communication
- d) optical frequency communication

59. MESFETs are increasingly being used at microwave frequencies. MESFET stands for :

- a) Metal semiconductor field effect transistor
- b) Modulation emission storage field effect transistor
- c) Minority electron surface field effect transistor
- d) None of the above

60. The following program code is for a single address (single operational instruction) Computer with one accumulator register Acc. Assume that there are no overflows in computation

```
LOAD C
ADD C
MUL C
STORE T1
ADD A
STORE T2
LOAD T1
MUL T2
STORE Z
```

which arithmetic expression is implemented by the above code ?:

- a) $Z = 2C^2A + 4C^4$
- b) $Z = 2C^2(A+C^2)$
- c) $Z = C^2(A+C^2)$
- d) $Z = 4C^2+A$

61. An input power of 17 dBm is incident on a connectorised junction whose VSWR is 2.0. Due to the effects of mismatch power reflected back at the junction is

- a) 15 dBm
- b) 5.56 mW
- c) 8.5 mW
- d) 10 mW

62. In a CMOS device power consumption

- a) increases with increasing frequency of operation
- b) remains constant at all frequencies of operation
- c) decreases with increasing frequency of operation
- d) None of the above

63. Morse code system is :

- a) binary
- b) ternary
- c) Quaternary
- d) None of the above

64. A bipolar transistor, when used as a switch, will be generally working in:

- a) Active region only
- b) Cut-off region only
- c) Active and Saturation regions
- d) Cut-off and saturation regions



65. In 'immediate addressing' mode :
- a) the effective address is within the instruction
 - b) the effective address is in a register
 - c) the effective address has to be computed
 - d) None of the above
66. The following type of memory needs a periodic refresh to retain data :
- a) SRAM
 - b) DRAM
 - c) ROM
 - d) PROM
67. A point on a Smith Chart has an impedance $X+jY$. To know the admittance at this point from the Smith Chart, one needs to move from the point along the circumference of the chart for an angle of
- a) 360°
 - b) 90°
 - c) 180°
 - d) None of the above
68. An abundance of "Holes" in a semiconductor indicates that it is :
- a) Intrinsic type
 - b) N-type
 - c) P-type
 - d) Mechanically brittle
69. The grounded base amplifier stage is used in conjunction with a LC network to realise an oscillator. LC network should provide a phase shift of:
- a) 90°
 - b) 0°
 - c) 180°
 - d) 30°
70. A non-maskable interrupt has generally:
- a) higher priority than maskable interrupts
 - b) lower priority than maskable interrupts
 - c) equal priority as maskable interrupts
 - d) None of the above
71. In any given family of logic circuits Fanout is a measure of:
- a) the number of standard gate inputs that can be driven by a single gate output
 - b) the number of outputs that can be connected to a standard gate input
 - c) the number of outputs that can be tied together
 - d) None of the above

72. 'A' Scope is a display in which data presentation is in the form of

- a) range Vs. target amplitude
- b) azimuth Vs. range
- c) azimuth Vs. elevation
- d) None of the above

73. Compared to TTL devices, CMOS devices have:

- a) higher DC noise margins
- b) lower DC noise margins
- c) the same noise margins
- d) None of the above

74. The power fed into a volume is equal to the algebraic sum of electric power dissipated as heat, plus reactive power proportional to the difference between the time average magnetic and electric energies stored in the volume plus the complex power transmitted across the surface enclosed by the volume. This is the :

- a) Faradays's Law
- b) Helmholtz theorem
- c) Poynting theorem
- d) Gauss Law

75. For a material to be a conductor the gap between valence and conduction band should be :

- a) low
- b) high
- c) zero
- d) not relevant

76. An odd-parity circuit can be realised using :

- a) only AND gates
- b) only OR gates
- c) only XOR gates
- d) None of the above

77. In the 8085, asserting the RESET IN input causes :

- a) the accumulator to be set to zero
- b) the program counter to be set to zero
- c) all internal register except PC to be set to zero
- d) None of the above



85. If a high-order frequency multiplication is required from a diode multiplier, the ideal choice of the diode at radio frequencies would be :

- a) Schottky point contact diode
- b) PIN diode
- c) Gunn Diode
- d) Step recovery diode

86. Voltage gain of a grounded collector amplifier is approximately

- a) 0.5
- b) 1.0
- c) 2.0
- d) 10.00

87. A half-adder circuit can be realised using only :

- a) 2-input NAND gates
- b) 2-input AND gates
- c) 2-input OR gates
- d) None of the above

88. Pick a coding scheme that has DC power :

- a) Manchester
- b) HDB3
- c) AMI
- d) duo binary

89. The minimum number of flip flops required to build a modulo-10 counter is ;

- a) 10 flip flops
- b) 5 flip flops
- c) 4 flip flops
- d) 2 flip flops

90. The main advantage of Archimedean spiral antennas is :

- a) high gain
- b) Narrow beamwidth
- c) Wide operating band width
- d) High power handling capability

91. The collector-to-emitter voltage VCE in a bipolar small signal transistor in saturation is typically:

- a) 2.
- b) 0.2V
- c) 1 V
- d) 1.2V



98. Cassegrain feed is used with a parabolic reflector to :
- a) increase the gain of the system
 - b) increase the beam width of the system
 - c) Allow the feed to be placed at a convenient point
 - d) improve the impedance matching with the reflector.
99. A superheterodyne receiver has been tuned to receive a signal frequency at 1400 kHz. During testing, it was noticed that the image frequency of 2300 kHz was also being received. Therefore it can be guessed that the receiver intermediate frequency is
- a) 900 kHz
 - b) 3700 kHz
 - c) 1850 kHz
 - d) 450 kHz
100. The 'diode-drop' across a small signal silicon diode is typically:
- a) 0.1V
 - b) 0.2V
 - c) 0.6V
 - d) 1.0V
